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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,876	11/21/2003	Warren M. Famworth	01-1059.3	3067

22823 7590 03/18/2005

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EXAMINER

BEREZNY, NEMA O

ART UNIT PAPER NUMBER

2813

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/719,876

Applicant(s)

FARNWORTH ET AL.

Examiner

Nema O. Berezny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 114-151 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 129-151 is/are allowed.
- 6) ☒ Claim(s) 114-128 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to Applicant's Amendment, filed 12-30-04 which has been entered and considered. Claims 114-151 are currently pending.

Claim Rejections - 35 USC § 112

The rejection of claim 116 under 35 USC 112 second paragraph, made in prior Office Action is hereby withdrawn, subsequent to correction by Applicant in Amendment filed 12-30-04.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 114 and 117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igel et al. (5,789,307) in view of Shinogi et al (6,534,387). Igel discloses a method for fabricating semiconductor components comprising: providing a plurality of semiconductor dice (Fig.1 el.14) on a substrate (el.10) having a first side, a second side, and a plurality of die contacts (inherent) on the first side; forming a layer (el.15) on the first side having a plurality of first slots in a criss cross pattern between the dice (Fig.2; col.3 lines 11-17, 28-34); forming an etch mask (el.15) on the second side having a plurality of second slots aligned with the first slots (Fig.1); and etching the substrate

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from the first side and the second side at a same time forming first grooves in the first side aligned with the first slots and second grooves in the second side aligned with the second slots for a time period sufficient to singulate the dice (col.3 lines 53-55; col.3 line 60 – col.4 line 22). However, Igel does not disclose forming a polymer layer on the first side or forming terminal contacts on said polymer layer. Igel would look to one such as Shinogi for protection and stacking of substrates because Shinogi discloses forming a polymer layer over a substrate and devices (Figs.8A-9C el.R), and forming a plurality of terminal contacts (el.12) on the polymer layer in electrical communication with the die contacts. Shinogi also discloses forming contact bumps (el.8) on the die contacts, forming the polymer layer on the die contacts, and planarizing the contact bumps and the patterned polymer layer (Fig.8A-9A). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the polymer layer and contacts of Shinogi with the method of Igel in order to provide a device protective layer, and said contacts would provide subsequent stacking of the substrates to form a multi-chip module. **[claims 114, 117].**

Claims 115, 121, 123-125, and 128 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi as applied to claims 114 and 117 above, and further in view of Wakabayashi (6,607,970). Igel in view of Shinogi do not disclose forming a sealing layer on the second side and edges of the dice, or applying tape to said second side. However, Igel and Shinogi would look to one such as Wakabayashi for additional device protection because Wakabayashi discloses following the etching

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step, forming a sealing layer on the second side and on edges of the dice to hermetically seal said side and said edges (col.5 lines 41-45). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the sealing layer of Wakabayashi with the method of Igel and Shinogi in order to provide protection from light and electromagnetic waves applied to the device (Wakabayashi - col.5 lines 53-56) **[claims 115, 121, 123]**.

Based upon the rejection of claim 121 above, Igel also discloses wherein the substrate comprises a semiconductor wafer (el.10) having streets separating the dice, and the first slots align with the streets (Fig.1) **[claim 128]**.

Based upon the rejection of claim 121 above, Shinogi also discloses wherein the terminal contacts comprise conductive bumps or balls (Fig.9B) **[claim 124]**; wherein the forming the contact bumps step comprises attaching or depositing a solder material to the die contacts (col.6 lines 19-21) **[claim 125]**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the bump or ball solder material of Shinogi with the method of Igel in order to provide a low temperature bonding material.

Claim 116 is rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi as applied to claim 114 above, and further in view of "Advanced Coating". Igel and Shinogi do not disclose a sealing layer of parylene. However, Igel and Shinogi would look to one such as "Advanced ..." for uniform coating because "Advanced ..." discloses wherein the sealing layer comprises parylene (p.5,6).

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Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the parylene sealing layer of "Advanced ..." with the method of Igel and Shinogi in order to provide a sealing layer with uniform coating ("Advanced ..." - p.1 para.1).

Claim 118 is rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi as applied to claim 114 above, and further in view of Nikkel (2002/0097302). Igel in view of Shinogi do not disclose an etching step via submerging the substrate. However, Igel and Shinogi would look to one such as Nikkel for a single etching step because Nikkel discloses wherein the etching step is performed by submerging the substrate in a wet etchant (p.4 para.57). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the etching of Nikkel with the method of Igel and Shinogi in order to provide complete etching of the wafer in a single etching step (Nikkel - p.3 para.56).

Claim 119 is rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi as applied to claim 114 above, and further in view of Chiang (6,774,659). Igel in view of Shinogi do not disclose depositing said polymer through a stencil. However, Igel and Shinogi would look to one such as Chiang for predetermined positioning because Chiang discloses wherein forming the polymer layer step comprises depositing a curable polymer through a stencil (col.10 lines 12-21). Therefore, it would have been obvious to a person of ordinary skill in the art at the time

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of the invention to use the stencil of Chiang with the method of Igel and Shinogi in order to provide predetermined positioning and locations (Chiang - col.10 lines 14-20).

Claim 120 is rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi as applied to claim 114 above, and further in view of Wang et al. (6,573,156). Igel and Shinogi do not disclose depositing and etching a polymer material. However, Igel and Shinogi would look to one such as Wang for easy separation because Wang discloses wherein the forming the polymer layer step comprises depositing and etching a polymer material (col.4 lines 4-9, 28-32). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the depositing and etching of Wang with the method of Igel and Shinogi in order to provide easy separation and alignment of the chips from the wafer during singulation (Wang – col.4 lines 27-35).

Claim 122 is rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi and Wakabayashi as applied to claim 121 above, and further in view of Saitoh (6,060,373). Igel in view of Shinogi and Wakabayashi do not disclose attaching a tape to said first side. However, Igel, Shinogi, and Wakabayashi would look to one such as Saitoh for holding the device secure because Saitoh discloses attaching a tape (Fig.1 el.13) to the first side, and performing backside substrate removing step and the applying step with the tape covering the polymer layer and the contact bumps (Fig.1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time

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of the invention to use the tape of Saitoh with the method of Igel, Shinogi, and Wakabayashi in order to hold the device secure during backside processing.

Claims 126-127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igel in view of Shinogi and Wakabayashi as applied to claim 121 above, and further in view of Nikkel (2002/0097302). Igel in view of Shinogi and Wakabayashi do not disclose an etching step using KOH or TMAH. However, Igel, Shinogi, and Wakabayashi would look to one such as Nikkel for an angled etch because Nikkel discloses wherein the etching step is performed using KOH in a first submerged etch step, and TMAH in a second submerged step (p.4 para.57). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the etching of Nikkel with the method of Igel, Shinogi, and Wakabayashi in order to provide an angled etch profile (Nikkel - p.3 para.56).

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter for claims 129-151:

Claims 142-151 were previously allowed for reasons of record. Independent claims 129 and 137 have been amended to incorporate the allowable elements of previously allowed claims 142-151, and subsequent to an updated search of the relevant prior art, are therefore found to be allowable for reasons of record.

Response to Arguments

Applicant's arguments with respect to claims 114-128 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nema O. Berezny whose telephone number is (571) 272-1686. The examiner can normally be reached on M-F 9-5:30.

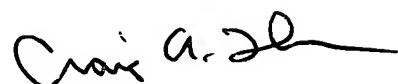
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (571) 272-1702. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NB



CRAIG A. THOMPSON
PRIMARY EXAMINER